**DB Notes: HGCAL Si Wafers & Sensors**

**HGCAL Detector Naming Scheme**

* **Important:** **Define a HGCAL detector naming scheme for all detector components that need to be tracked. (This is very important).** 
  + **Status: Not Final**

The HGCAL development DB currently has the following DB accounts (DB schemas) defined, each consisting of multiple inter-linked tables

CMS\_HGC\_CORE\_CONSTRUCT – to store detectors parts

CMS\_HGC\_CORE\_COND - to store meta data of user-generated data

CMS\_HGC\_CORE\_ATTRIBUTE – to store attribute information related to parts and data types

CMS\_HGC\_CORE\_MANAGEMNT – to store “management” data type, e.g. locations,

institutions, etc.

CMS\_HGC\_CORE\_IOV\_MNGMNT – to store data IOVs (interval of validity) of user

generated data.

CMS\_HGC\_HGCAL\_COND – to store user-generated data (in tables)

* A traceable HGCAL detector element is uniquely defined in the Database (DB) with a pair of parameters

1. **Kind of Part Name**
2. **Serial Number**

* A detector element can also have a unique **barcode** as its ID.
* The DB also provides an additional variable, **Name Label,** to uniquely specify a detector component. For the HGCAL DB, we have reserved the Name Label to define the unique hierarchical placement of the component on the detector. Use of a detector component hierarchical name enables users to quickly locate its placement on the detector.

**Umesh Joshi**

**March 12, 2021**

**HGCAL Detector Description & Silicon Module Naming Scheme**

For convenience, separate all geometry information into two groups

* Physical – to present the detector as constructed
* Logical – to present the detector in a more convenient form for storing detector related information

Adopt a coordinate system in which the +Z is along the direction of the B field of the solenoid, i.e. +B. For reference purposes, assume the +B direction points into the plane of display as shown in the figure. It follows then that +x is left and +y is up. This is the standard CMS coordinate system.

The official CMS coordinate system is:

+X: horizontal, in the direction of the LHC center,

+Y: up

+Z: towards Jura Mountains (B field is in the +z direction)

+Y

+X

+Z

**HGCAL Detector Hierarchy (Scintillator)**

**EM Si: DSK1 🡪 DSK 13 EM\_D1 🡪 EM\_D13 LYR1 🡪 LYR26**

**HAD Si: DSK 14 🡪 DSK 20 HAD\_D1 🡪 HAD\_D7 LYR27 🡪 LYR33**

**HAD mixed: DSK21 🡪 DSK 34 HAD\_D8 🡪 HAD\_D21 LYR34 🡪 LYR47**

**Changes from previous design:**

* **Original Design: 36 disks**
  + **14 double sided EM Si disks**
  + **8 single sided HAD disks**
  + **14 mixed disks**
* **removed 2 Si disks - 1 EM Si disk (2 layers) & 1 HAD Si disk (1 layer)**

**🡺 3 layers of Si – 2 EM & 1 HAD**

* **Current Design**
  + **13 double sided EM disks – 26 EM Si layers**
  + **7 single sided HAD disks – 7 HAD Si layers**
  + **14 single side mixed disks – 14 HAD mixed layers**

**HGCAL Detector Naming Scheme**

**Note:** All traceable components installed on a detector will have at least 2 of the following three unique IDs

* + **Barcode**
  + **Serial Number**
  + **Name Label**

A hierarchical Name Label is normally reserved for components and devices installed on the detector

**Detector Hierarchical Relationship Names:**

Parent: **HGCAL - detector**

Children: **HGC+ & HGC- - 2 arms**

**Detector Arms**

Parent: **HGC+ - HGC+ arm**

Children: **HGC+\_EM, HGC+\_HAD - EM & HAD sections**

Parent: **HGC- - HGC- arm**

Children: **HGC-\_EM, HGC-\_HAD - EM & HAD sections**

**HGC+\_EM Section: Naming Scheme**

* **EM section of HGC+ arm consists of 13 disks**
* **Each disk consists of six 600 segments with Si modules mounted on two sides of a 6mm thick copper plate, in which a small diameter stainless steel tube carries liquid CO2 to maintain the detector at a temperature of -300 C**
* **For DB purposes, we describe each disk as consisting of 2 Layers of Si modules mounted on it - Layer 0 (of Si modules) facing the IP (interaction point) and Layer 1 facing away from the IP**
* **Each Layer consists of six 600 Cassettes**
* **Each Cassette consists of Si modules of various geometries**

**Dm : Disk m = 1,2, . . ., 13 - EM Disks 1**🡪**13; Layers 1🡪 26**

**Ln: Layer n = 0, 1 - Layer 0 facing IP**

**CSTp EM Cassette p p = 1, 2, . . ., 6 - Six 600 CSTs per Disk**

**MODxy: Module x, y - Mod Posn within a Cassette**

**Hierarchical Relationships**

* Disks within Arm – 13 disks per arm
  + Parent: **HGC+\_EM** EM detector: +Z Arm
  + Children: HGC+\_EM\_Dm Disks: m = 1, 2, . . ., 13
* Layers within a disk – total 26 layers per arm
  + Parent: **HGC+\_EM\_Dm** **EM Disk**
  + Children:HGC+\_EM\_DmLn n = 0 (facing IP), 1 (facing away)
* Cassettes within a layer – Six 600 cassettes per layer.
  + Parent: **HGC+\_EM\_DmLn** **EM Layer**
  + Children: HGC+\_EM\_DmLn\_CSTp (Cassette p = 1, 2, . . ., 6)
* Modules within a Cassette
  + Parent: **HGC+\_EM\_DmLn\_CSTp** **EM Cassette**
  + Children: **HGC+\_EM\_DmLn\_CSTp\_MODuv****EM Modules**

(module has serial number and/or barcode)

**Module Name format: HGC+\_EM\_DmLn\_CSTp\_MODuv**

(Name label for modules mounted on detector)

* **Repeat above for HGC-\_EM arm**

**HGC+\_HAD Section: Naming Scheme**

* **HAD section of HGC+ arm consists of 21 single-sided disks, i.e. detectors are mounted only on the far side, L1, (away from IP)**
* **Of these, 7 (Disk 14 🡪 Disk 20) have only Si modules mounted (on L1 side)**
* **14 disks (Disk 21 🡪 34) are mixed disks with Si modules closer to the beam (radially) and scintillator modules farther from the beam.**
* **Each Layer consists of 12 (twelve) 300 half cassettes – 6 of type HCL & 6 of type HCR**
* **Two adjacent halves, HCL & HCR, can be termed to constitute a 600 cassette.**
* **A mixed half cassette consists of Si modules on the inner section (closer to the beam) and scintillator modules (away from the beam).**
* **The inner radius of the scintillator layer in a mixed cassette varies from 1504.23 mm @ Disk 21 (LYR34) to 1037.83 mm @ Disk 34 (LYR 47)**

**Naming Scheme within arm: HAD Disks, Cassettes, & Modules**

**HAD section consists of 7 Si disks (14 to 20) + 14 mixed disks (21 to 34)**

**HAD Si Disks**

**Dm : Disk m = 14, . . ., 34 - HAD Disk 14 🡪 34**

**Ln: Layer n = 1 - away from IP**

**CSTp : Cassette p p = 1, 2, . . ., 6 - 600 CSTs per Disk**

**HCL & HCR Half Cassettes - halves, L & R**

**MODxy : Si Module x, y (module: x, y - ???)**

Parent: **HGC+\_HAD HAD detector**

Children: HGC+\_HAD\_Dm (disk m = 14, 2, . . ., 34)

Parent: **HGC+\_HAD\_Dm** **HAD Disk**

Children:HGC+\_HAD\_Dm\_Ln (Layer n = 1 – 1: away from IP)

Parent: **HGC+\_HAD\_Dm\_Ln** **HAD Layer**

Children: HGC+\_HAD\_Dm\_Ln\_CSTp (Cassette p = 1, 2, . . ., 6)

Parent: **HGC+\_HAD\_DmLn\_CSTp** **HAD Cassette**

**Children: HGC+\_HAD\_DmLn\_CSTp**\_HCL **HAD Half Cassettes - L**eft

**+ HGC+\_HAD\_DmLn\_CSTp**\_HCR **HAD Half Cassettes - R**ight

Children: **HGC+\_HAD\_Dm\_Ln\_CSTp\_** HCL**\_MODxy****HAD Modules**

**HGC+\_HAD\_Dm\_Ln\_CSTp\_** HCR**\_MODxy**

**Module Name format: Dm\_Ln\_CSTp\_HCL\_MODxy**

**Dm\_Ln\_CSTp\_HCR\_MODxy**

**HAD Mixed Disks**

**Dm: Disk m = 14, . . ., 34 - HAD Disk 14 🡪 34**

**Ln: Layer n = 1 - away from IP**

**CSTp  Cassette p p = 1, 2, . . ., 6 - 600 CSTs per Disk**

**HCL & HCR Half Cassettes left & right - halves, L & R**

**Sl,c,r Tbrd Sgmnts l, c, r - Left, center, right**

**MODxy Si Module x, y**

Parent: **HGC+\_HAD HAD detector**

Children: HGC+\_HAD\_Dm (disk m = 1, 2, . . ., 21)

Parent: **HGC+\_HAD\_Dm** **HAD Disk**

Children:HGC+\_HAD\_DmLn (Layer n = 1 – 1: away from IP)

Parent: **HGC+\_HAD\_DmLn** **HAD Layer**

Children: HGC+\_HAD\_DmLn\_CSTp (Cassette p = 1, 2, . . ., 6)

Parent: **HGC+\_HAD\_DmLn\_CSTp** **HAD Cassette**

**Children: HGC+\_HAD\_DmLn\_CSTp**\_HCL **HAD Half Cassettes - L**eft

**+ HGC+\_HAD\_DmLn\_CSTp**\_HCR **HAD Half Cassettes - R**ight

Parent: **HGC+\_HAD\_Dm\_Ln\_CSTp**\_HCL Half cassette

Children: **HGC+\_HAD\_DmLn\_CSTp\_HCL\_Sl left segment**

**HGC+\_HAD\_DmLn\_CSTp\_HCL\_Sc center segment**

**HGC+\_HAD\_DmLn\_CSTp\_HCL\_Sr right segment**

**HGC+\_HAD\_DmLn\_CSTp\_HCL\_MODxy** HAD **Si module**

**Module Name format: HGC+\_HAD\_DmLn\_CSTp\_HCL\_MODxy**

**(Repeat above for HCR)**

**The HGCAL DB consists of**

**Si Sensor Wafers**

Wafers: **Kind of Part names**

120um HD Si Sensor Wafer

200um LD Si Sensor Wafer

300um LD Si Sensor Wafer

Wafer **Attributes:** Sensor Wafer Substrate

**Attribute Names** **Values**

Wafer Substrate STD, DD, FZ thin, Epi

Wafer Polarity n, p

Wafer Class prototype, pre-series, pre-production, production

**Sensor Attributes (Sensor only):**

* Sensors inherit wafer attributes.
* Sensor P-Stop: individual, common, none

**Module & Component Geometries**

**HD (high density) HGCAL Module Geometries -**

A picture containing drawing, door, kite

Description automatically generated Chart, treemap chart

Description automatically generated A picture containing chart

Description automatically generated

HD Full (**HD Type 0**) HD Top (**HD Type 1**) HD Bottom (**HD Type 2**)

Shape, polygon

Description automatically generated Shape, polygon

Description automatically generated Shape

Description automatically generated

HD Left (**HD Type 3**) HD Right (**HD Type 4**) HD Five (**HD Type 5**)

Left(-) Right(-)

* **HD module geometries**

HD Full HD Type 0 hexagonal

HD Top HD Type 1 half-hexagon (upper)

HD Bottom HD Type 2 ChopTwo

HD Left HD Type 3 Left (-)

HD Right HD Type 4 Right (-)

HD Five HD Type 5 Five

* Define in the DB
  + 6 types of HD EM Si Modules (120um Sensor)
  + 6 types of HD HAD Si modules (120um Sensor)

**LD (low density) HGCAL Module Geometries**

A picture containing drawing, door, kite

Description automatically generated Chart, treemap chart

Description automatically generated Chart, treemap chart

Description automatically generated

**LD Full (LD Type 0) LD Top (LD Type 1) LD Bottom (LD Type 2)**

Shape, polygon

Description automatically generated Shape, polygon

Description automatically generated Shape

Description automatically generated

**LD Left (LD Type 3) LD Right (LD Type 4) LD Five (LD Type 5)**

Left Right

A close up of a logo

Description automatically generated

**LD Three (LD Type 6) LD Full+Three (LD Type 7) - multiple versions to be defined**

* **LD module geometries**

LD Full LD Type 0 hexagonal

LD Top LD Type 1 half-hexagon (upper)

LD Bottom LD Type 2 half-hexagon (lower)

LD Left LD Type 3 Left (half)

LD Right LD Type 4 Right (half)

LD Five LD Type 5 Five

LD Three LD Type 6 valid **only for Si sensors**

LD (Full+Three) LD Type 7 valid for Module, Protomodule, PCB,

& Baseplate

* Define in the DB
  + 7 types of LD EM Si Modules (120um Sensor)
  + 7 types of LD HAD Si modules (120um Sensor)

**DB Definitions for Si Sensors – HD & LD**

**DB: Kind of Part Names – Si Sensor Wafers**

**Kind of part name** **- HD & LD Si Wafers**

**HD 120um Si Sensor Wafer**

**LD 200um Si Sensor Wafer**

**LD 300um Si Sensor Wafer**

* Label Colours
  + **Blue: HD & LD geometries identical**
  + **Red: HD & LD geometries different**

**>> DB Relationship:**

Parent: HD 120um Si Sensor Wafer

Children: HD 120um Si Sensors defined below

+ six 120um HD Halfmoons

**DB: Kind of Part Names – HD 120um Si Sensors**

**Kind of part name** **Geometry Description LPNAME**

120um Si Sensor HD Full Full **120um Sensor HD Type 0**

120um Si Sensor HD Top Top(half) **120um Sensor HD Type 1**

120um Si Sensor HD Bottom Bottom(ChopTwo) **120um Sensor HD Type 2**

120um Si Sensor HD Left Left(-) **120um Sensor HD Type 3**

120um Si Sensor HD Right Right(-) **120um Sensor HD Type 4**

120um Si Sensor HD Five Five **120um Sensor HD Type 5**

120um Si Sensor HD Halfmoon-N hlfmoon-Top

120um Si Sensor HD Halfmoon-S hlfmoon-Bot

120um Si Sensor HD Halfmoon-NW hlfmoon-Cleft

120um Si Sensor HD Halfmoon-SW hlfmoon-Bleft

120um Si Sensor HD Halfmoon-SE hlfmoon-Bright

120um Si Sensor HD Halfmoon-NE hlfmoon-Tright

**Kind of Part Names – LD 200um Sensors**

**>> DB Relationship:**

Parent: LD 200um Si Sensor Wafer

Children: LD 200um Si Sensors defined below

+ Six 200um HD Halfmoons

**Kind of part name Geometry Description LPNAME**

200um Si Sensor LD Full Full **200um Sensor LD Type 0**

200um Si Sensor LD Top Top(half) **200um Sensor LD Type 1**

200um Si Sensor LD Bottom Bottom(half) **200um Sensor LD Type 2**

200um Si Sensor LD Left Left(half) **200um Sensor LD Type 3**

200um Si Sensor LD Right Right(half) **200um Sensor LD Type 4**

200um Si Sensor LD Five Five **200um Sensor LD Type 5**

200um Si Sensor LD Three Three **200um Sensor LD Type 6**

200um Si Sensor LD Halfmoon-N halfmoon-Top

200um Si Sensor LD Halfmoon-S halfmoon-Bot

200um Si Sensor LD Halfmoon-NW halfmoon-Tleft

200um Si Sensor LD Halfmoon-SW halfmoon-Bleft

200um Si Sensor LD Halfmoon-SE halfmoon-Bright

200um Si Sensor LD Halfmoon-NE halfmoon-Tright

**Kind of Part Names – LD 300um Sensors**

**>> DB Relationship:**

Parent: LD 300um Si Sensor Wafer

Children: LD 300um Si Sensors defined below

+ Six 300um LD Si Halfmoons

**Kind of part name Geometry Description LPNAME**

300um Si Sensor LD Full Full **300um Sensor LD Type 0**

300um Si Sensor LD Top Top(half) **300um Sensor LD Type 1**

300um Si Sensor LD Bottom Bottom(half) **300um Sensor LD Type 2**

300um Si Sensor LD Left Left(half) **300um Sensor LD Type 3**

300um Si Sensor LD Right Right(half) **300um Sensor LD Type 4**

300um Si Sensor LD Five Five **300um Sensor LD Type 5**

300um Si Sensor LD Three Three **300um Sensor LD Type 6**

300um Si Sensor LD Halfmoon-N halfmoon-Top

300um Si Sensor LD Halfmoon-S halfmoon-Bot

300um Si Sensor LD Halfmoon-NW halfmoon-Tleft

300um Si Sensor LD Halfmoon-SW halfmoon-Bleft

300um Si Sensor LD Halfmoon-SE halfmoon-Bright

300um Si Sensor LD Halfmoon-NE halfmoon-Tright

**Tables to Store Si Sensor Data in DB**

Description of information listed below

* **Kind of condition name:** descriptive name of data type
* **Table:** name of table for the data

**Kind of condition: HGC CERN Sensor IV**

**Table: HGC\_CERN\_SENSOR\_IV**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_CERN\_SENSOR\_IV**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CURNT\_NANOAMP FLOAT(126) NOT NULL,**

**ERR\_CURNT\_NANOAMP FLOAT(126),**

**TOT\_CURNT\_NANOAMP FLOAT(126),**

**ACTUAL\_VOLTS FLOAT(126),**

**TIME\_SECS FLOAT(126),**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**CELL\_NR NUMBER(10)**

**)**

**Example: XML Template for table HGC CERN Sensor IV**

**<ROOT>**

**<HEADER>**

**<TYPE>**

**<!-- Comment: Table Name -->**

**<EXTENSION\_TABLE\_NAME>HGC\_CERN\_SENSOR\_IV</EXTENSION\_TABLE\_NAME>**

**<!-- Kind of condition name -->**

**<NAME>** **HGC CERN Sensor IV</NAME>**

**</TYPE>**

**<RUN>**

**<RUN\_NAME>Your Run Name</RUN\_NAME>**

**<!***-- Enter your timestamp -->*

**<RUN\_BEGIN\_TIMESTAMP>2018-05-14 00:00:00</RUN\_BEGIN\_TIMESTAMP>**

**<RUN\_END\_TIMESTAMP>2018-05-14 00:00:00</RUN\_END\_TIMESTAMP>**

**<INITIATED\_BY\_USER>Your Name</INITIATED\_BY\_USER>**

**<LOCATION>CERN</LOCATION>**

**<COMMENT\_DESCRIPTION>Your Comments</COMMENT\_DESCRIPTION>**

**</RUN>**

**</HEADER>**

**<DATA\_SET>**

**<PART>**

**<!-- Kind of Part name -->**

**<KIND\_OF\_PART>HGC Sensor</KIND\_OF\_PART>**

**<!-- Sensor serial number -->**

**<SERIAL\_NUMBER>XXXXXXXXXXXXXXXXXXX</SERIAL\_NUMBER>**

**</PART>**

**<DATA> <!-- table columns with data -->**

**<VOLTS>-25</VOLTS>**

**<CURNT\_NANOAMP>-7.609905</CURNT\_NANOAMP>**

**<ERR\_CURNT\_NANOAMP>0.01653122</ERR\_CURNT\_NANOAMP>**

**<TOT\_CURNT\_NANOAMP>-2000</TOT\_CURNT\_NANOAMP>**

**<ACTUAL\_VOLTS>-25</ACTUAL\_VOLTS>**

**<TIME\_SECS>10</TIME\_SECS>**

**<TEMP\_DEGC>23</TEMP\_DEGC>**

**<HUMIDITY\_PRCNT>46.6</HUMIDITY\_PRCNT>**

**<CELL\_NR>YYYY</CELL\_NR>**

**</DATA>**

**.**

**.**

**.**

**<DATA>**

**<VOLTS>-100</VOLTS>**

**<CURNT\_NANOAMP>-7.609905</CURNT\_NANOAMP>**

**<ERR\_CURNT\_NANOAMP>0.01653122</ERR\_CURNT\_NANOAMP>**

**<TOT\_CURNT\_NANOAMP>-2000</TOT\_CURNT\_NANOAMP>**

**<ACTUAL\_VOLTS>-25</ACTUAL\_VOLTS>**

**<TIME\_SECS>10</TIME\_SECS>**

**<TEMP\_DEGC>23</TEMP\_DEGC>**

**<HUMIDITY\_PRCNT>46.6</HUMIDITY\_PRCNT>**

**<CELL\_NR>YYYY</CELL\_NR>**

**</DATA>**

**</DATA\_SET>**

**</ROOT>**

**Kind of condition: HGC CERN Sensor IV Summary**

**Table: HGC\_CERN\_SENSOR\_IV\_SUMRY**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_CERN\_SENSOR\_IV\_SUMRY**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**TOT\_CURNT\_NANOAMP\_600V FLOAT(126),**

**TOT\_CURNT\_NANOAMP\_800V FLOAT(126),**

**NUM\_BAD\_CELLS NUMBER(10),**

**PASS CHAR(1 BYTE),**

**GRADE CHAR(10 BYTE),**

**NUM\_BAD\_ADJ\_CELLS NUMBER(10)**

**)**

**Kind of condition: HGC CERN Sensor CV**

**Table: HGC\_CERN\_SENSOR\_CV**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_CERN\_SENSOR\_CV**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CPCTNCE\_PFRD FLOAT(126) NOT NULL,**

**ERR\_CPCTNC\_PFRD FLOAT(126),**

**TOT\_CURNT\_NANOAMP FLOAT(126),**

**ACTUAL\_VOLTS FLOAT(126),**

**ORG\_CPCTNC\_PFRD FLOAT(126),**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**IMP\_OHM FLOAT(126),**

**PHS\_RAD FLOAT(126),**

**TIME\_SECS FLOAT(126),**

**CELL\_NR NUMBER(10)**

**)**

**Kind of condition: HGC CERN Sensor CV Summary**

**Table: HGC\_CERN\_SENSOR\_CV\_SUMRY**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_CERN\_SENSOR\_CV\_SUMRY**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**SNSR\_THCKNESS FLOAT(126),**

**DEPL\_VOLTS FLOAT(126),**

**MAX\_DEPL\_VOLTS FLOAT(126),**

**DEPL\_UNIF\_VOLTS FLOAT(126),**

**SNSR\_THKNES\_UNIF FLOAT(126),**

**PASS CHAR(1 BYTE),**

**GRADE CHAR(10 BYTE)**

**)**

**Kind of condition: HGC PQC Summary**

**Table: HGC\_PQC\_SUMRY**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_SUMRY**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VFLATBAND\_VOLT FLOAT(126),**

**VTHRESHOLD\_VOLT FLOAT(126),**

**ISURF\_AMP FLOAT(126),**

**RSHEET\_N\_OHMSQ FLOAT(126),**

**RSHEET\_P\_OHMSQ FLOAT(126),**

**RSHEET\_PSTOP\_OHMSQ FLOAT(126),**

**VBD\_DIODE\_VOLT FLOAT(126),**

**VBD\_OXIDE\_VOLT FLOAT(126)**

**)**

**Kind of condition: HGC PQC Diode IV**

**Table: HGC\_PQC\_DIODE\_IV**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_DIODE\_IV**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CURNT\_NANOAMP FLOAT(126) NOT NULL,**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**TIME\_SECS FLOAT(126)**

**)**

**Kind of condition: HGC PQC Diode CV**

**Table: HGC\_PQC\_DIODE\_CV**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_DIODE\_CV**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CPCTNCE\_FRD FLOAT(126) NOT NULL,**

**RESISTANCE\_OHM FLOAT(126),**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**TIME\_SECS FLOAT(126)**

**)**

**Kind of condition: HGC PQC Metal Oxide Semiconductor**

**Table: HGC\_PQC\_MOS**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_MOS**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CPCTNCE\_FRD FLOAT(126) NOT NULL,**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**TIME\_SECS FLOAT(126)**

**)**

**Kind of condition: HGC PQC Field Effect Transistor**

**Table: HGC\_PQC\_FET**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_FET**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CURNT\_AMP FLOAT(126) NOT NULL,**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**TIME\_SECS FLOAT(126)**

**)**

**Kind of condition: HGC PQC Gate Controlled Diode**

**Table: HGC\_PQC\_GCD**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_GCD**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CURNT\_AMP FLOAT(126) NOT NULL,**

**BIAS\_VOLT FLOAT(126) NOT NULL,**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**TIME\_SECS FLOAT(126)**

**)**

**Kind of condition: HGC PQC Van Der Pauw N**

**HGC PQC Van Der Pauw PEdge**

**HGC PQC Van Der Pauw PStop**

**Table: HGC\_PQC\_VAN\_DER\_PAUW**

**Note: This table hosts 3 different types of data**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_VAN\_DER\_PAUW**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CURNT\_AMP FLOAT(126) NOT NULL,**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**TIME\_SECS FLOAT(126)**

**)**

**Kind of condition: HGC PQC Linewidth N**

**HGC PQC Linewidth PEdge**

**HGC PQC Linewidth PStop**

**Table: HGC\_PQC\_LINEWIDTH**

**Note: This table hosts 3 different types of data**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_LINEWIDTH**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CURNT\_AMP FLOAT(126) NOT NULL,**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**TIME\_SECS FLOAT(126)**

**)**

**Kind of condition: HGC PQC Oxide Breakdown**

**Table: HGC\_PQC\_OXIDE\_BREAKDOWN**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_PQC\_OXIDE\_BREAKDOWN**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**VOLTS FLOAT(126) NOT NULL,**

**CURNT\_AMP FLOAT(126) NOT NULL,**

**TEMP\_DEGC FLOAT(126),**

**HUMIDITY\_PRCNT FLOAT(126),**

**TIME\_SECS FLOAT(126)**

**)**

**Kind of condition: HGC Sensor Irradiation Summary Data**

**Table: HGC\_SENSOR\_IRRADIATION\_SUMRY**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_SENSOR\_IRRADIATION\_SUMRY**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**DOPING VARCHAR2(32 BYTE),**

**IRRAD\_FACILITY VARCHAR2(126 BYTE),**

**FLUNCE\_TARGET\_NEQV FLOAT(126),**

**FLUNCE\_NOMNL\_NEQV FLOAT(126),**

**ERR\_FLUNCE\_NOMNL FLOAT(126),**

**FULL\_DPLTN\_VOLT FLOAT(126),**

**LKCURNT\_DNSTY\_MA\_CM3 FLOAT(126),**

**ERR\_LKCURNT\_DNSTY FLOAT(126),**

**ANNEALED VARCHAR2(16 BYTE),**

**FLUNCE\_XTRACTD\_NEQV FLOAT(126),**

**ERR\_FLUNCE\_XTRACTD FLOAT(126)**

**)**

**Example: XML Template for table HGC Sensor Irradiation Summary IV**

**<?xml version="1.0" encoding="UTF-8" standalone="yes"?>**

**<ROOT xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">**

**<HEADER>**

**<TYPE>**

**<EXTENSION\_TABLE\_NAME>HGC\_SENSOR\_IRRADIATION\_SUMRY</EXTENSION\_TABLE\_NAME>**

**<NAME>HGC Sensor Irradiation Summary Data</NAME>**

**</TYPE>**

**<RUN>**

**<RUN\_NAME>HGC Sensor Irradiation Data From Timo Peltola V1</RUN\_NAME>**

**<RUN\_BEGIN\_TIMESTAMP>2018-03-01 00:00:00</RUN\_BEGIN\_TIMESTAMP>**

**<RUN\_END\_TIMESTAMP>2018-03-01 00:00:00</RUN\_END\_TIMESTAMP>**

**<INITIATED\_BY\_USER>Timo Peltola</INITIATED\_BY\_USER>**

**<COMMENT\_DESCRIPTION> Data From Timo Peltola</COMMENT\_DESCRIPTION>**

**</RUN>**

**</HEADER>**

**<DATA\_SET>**

**<COMMENT\_DESCRIPTION> Data from Timo Peltola </COMMENT\_DESCRIPTION>**

**<VERSION>V1</VERSION>**

**<PART>**

**<KIND\_OF\_PART>HGC HPK Six Inch Silicon Sensor</KIND\_OF\_PART>**

**<SERIAL\_NUMBER>HPK\_6in\_128\_0016</SERIAL\_NUMBER>**

**</PART>**

**<DATA>**

**<DOPING>p-on-n</DOPING>**

**<IRRAD\_FACILITY>RI</IRRAD\_FACILITY>**

**<FLUNCE\_TARGET\_NEQV>1500000000000000</FLUNCE\_TARGET\_NEQV>**

**<FLUNCE\_NOMNL\_NEQV>1300000000000000</FLUNCE\_NOMNL\_NEQV>**

**<ERR\_FLUNCE\_NOMNL>300000000000000</ERR\_FLUNCE\_NOMNL>**

**<FULL\_DPLTN\_VOLT>500</FULL\_DPLTN\_VOLT>**

**<LKCURNT\_DNSTY\_MA\_CM3>54</LKCURNT\_DNSTY\_MA\_CM3>**

**<ERR\_LKCURNT\_DNSTY>6</ERR\_LKCURNT\_DNSTY>**

**<ANNEALED>no</ANNEALED>**

**<FLUNCE\_XTRACTD\_NEQV>1360000000000000</FLUNCE\_XTRACTD\_NEQV>**

**<ERR\_FLUNCE\_XTRACTD>140000000000000</ERR\_FLUNCE\_XTRACTD>**

**</DATA>**

**</DATA\_SET>**

**.**

**.**

**.**

**<DATA\_SET>**

**<COMMENT\_DESCRIPTION>HGCAL Sensor Irradiation</COMMENT\_DESCRIPTION>**

**<VERSION>V1</VERSION>**

**<PART>**

**<KIND\_OF\_PART>HGC HPK Eight Inch Silicon Sensor</KIND\_OF\_PART>**

**<SERIAL\_NUMBER>HPK\_8in\_256\_0014</SERIAL\_NUMBER>**

**</PART>**

**<DATA>**

**<DOPING>n-on-p</DOPING>**

**<IRRAD\_FACILITY>RI</IRRAD\_FACILITY>**

**<FLUNCE\_TARGET\_NEQV>1500000000000000</FLUNCE\_TARGET\_NEQV>**

**<FLUNCE\_NOMNL\_NEQV>1300000000000000</FLUNCE\_NOMNL\_NEQV>**

**<ERR\_FLUNCE\_NOMNL>300000000000000</ERR\_FLUNCE\_NOMNL>**

**<FULL\_DPLTN\_VOLT>325</FULL\_DPLTN\_VOLT>**

**<LKCURNT\_DNSTY\_MA\_CM3>26</LKCURNT\_DNSTY\_MA\_CM3>**

**<ERR\_LKCURNT\_DNSTY>2</ERR\_LKCURNT\_DNSTY>**

**<ANNEALED>no</ANNEALED>**

**<FLUNCE\_XTRACTD\_NEQV>650000000000000</FLUNCE\_XTRACTD\_NEQV>**

**<ERR\_FLUNCE\_XTRACTD>40000000000000</ERR\_FLUNCE\_XTRACTD>**

**</DATA>**

**</DATA\_SET>**

**</ROOT>**

**Kind of condition: HGCAL Sensor Defect Checks**

**Table: HGC\_SENSOR\_DEFECT\_CHECKS**

**CREATE TABLE CMS\_HGC\_HGCAL\_COND.HGC\_SENSOR\_DEFECT\_CHKS**

**(**

**RECORD\_ID NUMBER(38) NOT NULL,**

**CONDITION\_DATA\_SET\_ID NUMBER(38) NOT NULL,**

**SCRATCH\_FRNT VARCHAR2(8 BYTE),**

**SCRATCH\_BCK VARCHAR2(8 BYTE),**

**RESIDL\_ON\_BNDPADS VARCHAR2(8 BYTE),**

**LOW\_IV\_BRKDWN\_VLTS VARCHAR2(8 BYTE),**

**HIGH\_DRKCURNT VARCHAR2(8 BYTE),**

**UNSTBL\_DRKCURNT VARCHAR2(8 BYTE),**

**SHORTD\_CHANS VARCHAR2(8 BYTE)**

**)**

**Instructions to Load Data in DB**

Copy your XML files to the spool area of the HGCAL DB loader to load the data in the DB

**Command to Load Data in HGCAL INT2R database**

scp <file> xml [joshi@dbloader-hgcal.cern.ch:/home/dbspool/spool/hgcal/int2r](mailto:joshi@dbloader-hgcal.cern.ch:/home/dbspool/spool/hgcal/int2r)

**Command to Load Data in HGCAL CMSR database**

scp <file> xml [joshi@dbloader-hgcal.cern.ch:/home/dbspool/spool/hgcal/cmsr](mailto:joshi@dbloader-hgcal.cern.ch:/home/dbspool/spool/hgcal/cmsr)

1. Copy xml or zip file to spool area, e.g.

Development DB – int2r

scp <file> xml [joshi@dbloader-hgcal.cern.ch:/home/dbspool/spool/hgcal/int2r](mailto:joshi@dbloader-hgcal.cern.ch:/home/dbspool/spool/hgcal/int2r)

Production DB – cmsr

scp <file> xml [joshi@dbloader-hgcal.cern.ch:/home/dbspool/spool/hgcal/int2r](mailto:joshi@dbloader-hgcal.cern.ch:/home/dbspool/spool/hgcal/int2r)

The DB loader process will pick up the files, read the data contained, and write into the DB.

1. Check the state of your job

View the contents of the file */home/dbspool/state/hgcal/int2r/filename.xml*

0 🡪 success

Not 0 🡪 error

No such file 🡪 pending

1. Check the log file */home/dbspool/logs/hgcal/int2r/filename.xml* for log information.